REMARKS/ARGUMENTS

Claims 1 and 10 have been amended by the instant response. No claims have been canceled. Accordingly, claims 1-27 remain pending.

Embodiments in accordance with the present invention relate to methods and apparatuses wherein a thin oxide film is formed as the result of successive introduction and purging of TEOS and ozone. Only after exposure to both TEOS and ozone, is a thin layer of silicon oxide formed:

(A) $SiOH^* + Si(OCH_2CH_3)_4 \rightarrow SiOSi(OEt)_3^* + EtOH$
(B) purge TEOS
(C) $SiOEt^* + O_3 \rightarrow SiOH^* + \underline{SiOSi}^* + CO + H_2O$
(Emphasis added; ¶**[18]**)

In order to emphasize the need for exposure to both TEOS and ozone to form the thin oxide layer in accordance with embodiments of the present invention, claims 1 and 10 have now been amended as indicated in the above claim listing.

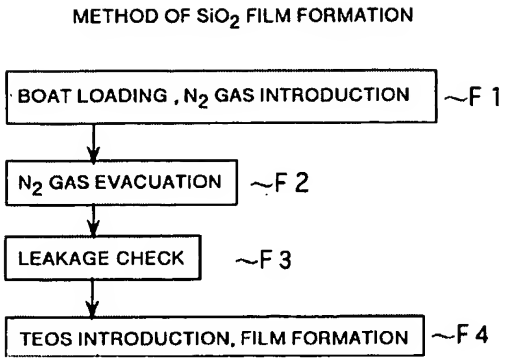
Pending claims 1-22 have been rejected, either as anticipated under 35 U.S.C. §102 by U.S. patent no. 5,928,428 to Horie ("the Horie patent"), or obvious under 35 U.S.C. §103 in view of the Horie patent combined with U.S. patent no. 6,180,490 to Vassiliev et al. ("the Vassiliev patent"), purportedly admitted prior art, and the article to Gasser et al. These claim rejections are traversed as follows.

As a threshold matter, the Examiner is reminded that certain of the claims stand rejected as anticipated, and not merely obvious, in light of the references relied upon by the Examiner:

> [t]he distinction between rejections based on 35 U.S.C. 102 and those based on 35 U.S.C. 103 should be kept in mind. Under the former, the claim is anticipated by the reference. No question of obviousness is present. In other words, for anticipation under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. (Emphasis added; MPEP 706.02)

Here, the Horie patent, taken alone or in even in combination with other references, fails to teach forming silicon oxide through successive exposure and purging of TEOS and ozone.

Like the instant application, the Horie patent describes deposition of silicon oxide utilizing TEOS as a precursor. Unlike the instant application, however, the Horie patent does not describe the use of ozone in the deposition of silicon oxide. Rather, as shown and described in connection with Figure 2 (reproduced in part below), the Horie patent teaches only the deposition of silicon oxide on a substrate prior to the introduction of ozone:



> Step 4: TEOS introduction and film formation (FIG. 2, Step F4)
> The valve 5a for introducing TEOS gas is opened, and TEOS gas is introduced into the quartz chamber 1 at a flow rate of 100 cc/min. (cc per minute) under conditions of a temperature of 670 °C and a pressure of 173 Pa (1.3 Torr) adjusted by the mass flow controller 6a for adjusting the flow rate of TEOS gas. Thereby, a silicon oxide film is formed on the surface of silicon wafers 3. (Emphasis added; col. 5, lines 17-26)

Only after deposition of silicon oxide is complete, does the Horie patent purge the TEOS and introduce oxygen-containing gas such as ozone into the chamber. This is because the oxygen-containing does not participate in formation of the silicon oxide on the substrate. Rather, the role of the ozone is to react with TEOS residue remaining in the chamber exhaust, thereby reducing particle contamination of the already-formed oxide:

> vacuum exhaust pipe 7 is heated to a high temperature throughout the process, and the chamber 1 is evacuated while oxygen-based gas is flowing. Thereby, the oxidation of TEOS gas, which is deposited in the exhaust vacuum pipe 7 without reacting, is accelerated and their mass decreases, and their composition approaches to a silicon oxide (SiO_2) film. Therefore, fine particles and out-gassing generated from the non-reacted gas decrease. As a result, the amount of particles which deposit on the silicon wafers 3 decreases, and the reproducibility of thickness of the formed silicon oxide film is improved. (Emphasis added, col. 6, lines 9-19)

There is no teaching or even suggestion in the Horie patent, regarding any role played by ozone in the original formation of silicon oxide on the substrate. Accordingly, pending claims 1-22 cannot legitimately be argued as being anticipated by the Horie patent. The anticipation claim rejections are improper and should be withdrawn.

Moreover, pending claims 1-22 also cannot be considered obvious in light of the Horie patent. Specifically, in order to establish a prima facie case of obviousness, "the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP 2142.

Here, combination of the Horie patent with the Vassiliev patent, or any other reference relied upon by the Examiner, fails even to suggest the elements of the pending claims. Specifically, the Hoire patent utterly fails to teach or suggest a process wherein ozone introduced after the purging of TEOS, results in formation of silicon oxide. Inclusion of the Vassiliev patent does nothing to cure such an absence of any such teaching.

Like the instant application, the Vassiliev patent does describe a silicon oxide formation process utilizing TEOS as a precursor. However, the Vassiliev patent specifically describes this deposition process as resulting from reaction between TEOS and ozone present in the chamber at the same time. (See generally, col. 6, lines 28-65). There is no teaching or even suggestion in the Vassiliev patent, regarding the purging of TEOS prior to the introduction of ozone.

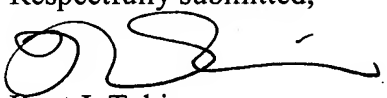
As for the Gasser article relied upon by the Examiner, this reference describes an oxide formation mechanism which utilizes neither TEOS nor ozone. This reference cannot be relied upon to provide a teaching regarding the TEOS and ozone-based deposition system in accordance with the claimed embodiments of the present invention.

Based at least upon the above differences between the pending claims and the art relied upon by the Examiner, it is respectfully asserted that claims 1-22 cannot be considered obvious. Continued rejection of these claims is improper, and the obviousness rejections should be withdrawn.

Finally, Applicants appreciate the Examiner's indication of allowable subject matter in the latest office action. Specifically, the Examiner indicated claims 23-27 were allowed, and these claims have not been amended by the instant response. It is therefore respectfully asserted that claims 23-27 remain in condition for allowance, and early action to that effect is requested.

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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